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# USSR Report

MACHINE TOOLS AND METALWORKING EQUIPMENT

No. 9

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USSR REPORT  
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PARTY OFFICIALS AT MACHINE TOOL PLANT SPEAK OUT ON PRODUCTIVITY

Moscow MOSKOVSKAYA PRAVDA in Russian 26 Jul 83 p 2

[Unattributed article: "To Raise the Efficiency and Quality of Work. From a Party Meeting of the Plant for Transfer Machines imeni 50-Letiye SSSR"]

[Text] At the Plant for Transfer Machines imeni 50-Letiye SSSR a party meeting took place which discussed the question "On the Results of the June (1983) Plenum of the CPSU Central Committee and the Tasks of the Party Organization of the Plant That Flow From the Decision of the Plenum and the Speech of the General Secretary of the CPSU Central Committee, Comrade Yu. V. Andropov".

V. S. Frolov, head of the Department of Machine Building of the CPSU Central Committee, gave a report at the party meeting.

The following individuals spoke at the meeting: A. V. Puchkov, milling machine operator at Shop No 5, K. D. Stafidov, director of Shop No 4, P. A. Abrosov, fitter at Shop No 6, L. P. Veshnikova, head of the plant party office, T. N. Polyakova, deputy secretary of the plant committee of the VLKSM [All-Union Lenin Young Communist League], L. P. Ivanenko, head of the bureau of the chief process engineer, and V. P. Shcherbakov, general director of the association for the output of transfer machines and special automatic machines.

The July (1983) Plenum of the CPSU Central Committee, V. S. Frolov said, has become an enormous political event in the life of the party and the country. It defined the main directions for the improvement of ideological and political work among the masses under present conditions, it formulated theoretical problems and set forth practical tasks for the improvement of developed socialism, and provided the main directions for the preparation of the new edition of the Program of the CPSU.

For all of our economic successes we are obliged to the enormous ideological and educational work of the party among the masses. This is graphically

traced in the example of the party organization and the labor collective of your enterprise. The party committee is skillfully conducting ideological work among the workers, which in many respects encourages the attainment of high production indicators by the enterprise.

In talking further about unutilized reserves, the speaker emphasized that the industrial production plans are being fulfilled by the plant, but they are still being fulfilled at the price of considerable labor and material expenditures. But the present stage of management makes it necessary to work more rationally and efficiently, to make judicious use of everything at our disposal, of the entire production and scientific-technical potential.

In the economic sphere, the key task is a cardinal increase in labor productivity. As comrade Yu. V. Andropov said, we must strive to attain the higher world level in this plan. Now, in the conditions of the scientific-technical revolution, this task has acquired special significance, both for our domestic construction and in the international plan.

In the speech it was emphasized that the core of all machine construction is machine tool construction, which now is a powerful sector of the industry of our country. It plays a key role in the increase of the efficiency of the entire machine building output and in the final analysis in the national economy as a whole.

The speaker analyzed in detail the shortcomings in the development of machine building. Speaking in particular about the work of the collective of the enterprise, he emphasized that as a whole the technical level of production of the plant still leaves much to be desired. Even if in terms of productivity and precision the machine tools and transfer machines correspond approximately to the contemporary level, in terms of reliability, longevity and control systems they lag behind the best of them.

One cannot acknowledge as normal the fact, he continued, that the transfer machines become detached and are neglected in operation in the course of 2-3 years. This is not in line with any norms. For this reason all measures must be taken in order to raise the qualitative level of the work of the machine tool design office and the plant, to eliminate design and production imperfections not in the process of the adjustment of the machines on the premises of the client, but in the design office and in the plants of the association.

One of the most important long-term tasks of the plant is the mastery of the production of machines for the manufacture of mass components for tractor and automobile engines--valves, pistons, bushings, and other items. During 1984-1985 the enterprises of the Ministry of Tractor and Agricultural Machine Building will have to manufacture 87 transfer machines, which amounts to 80 percent of the plan for the output of all machines at the plant. This production, which goes toward the realization of the Food Program, must be regarded among the most important in the five-year-plan.

It is the duty of the communists of the plant, by all means of party influence--the activation of political and organizational work, the increase of exactingness toward cadres, and the intensification of party control--to attain

constant improvement of the parameters of the technical equipment being turned out, to withdraw obsolete products from production in time. The decisions of the July Plenum of the CPSU Central Committee demand this of us. We must also not lose sight of the technical level of consumer products. In this question the plant is not directly involved since, with the exception of hasp locks, it does not produce anything.

The speaker further dwelt on the problems of the introduction of industrial robots and manipulators into the national economy. In particular, he emphasized that the party organization and the administration of the plant must deal objectively with the introduction of robots. In conditions of a deficit of labor resources, this is of great significance and must be dealt with more actively.

The management of the plant, he continued, must show greater concern for the mechanization of manual labor. One-third of the workers perform manual labor. Not everywhere in the plants have the requisite social and everyday conditions been created. But you know, the main productive force is the individual. This means that his labor must be clearly and skillfully organized, that it must bring him satisfaction. Then the conduct of both organizational and educational work will be easier.

For this reason the time has come to devote greater attention to the technology of production and to increase its level in all shops and sections, to increase the role of the process engineer.

Quality, it was emphasized in the report, is directly linked with technology. These are links of the same mechanism. At the present time, the problem of increasing the quality of articles is acquiring ever-increasing significance and is already not merely a prestige question, but to a larger extent a political question.

The constant search for new levers and methods of influence on the increase of the indicator of production quality must become an urgent matter of the party, trade union and Komsomol organizations, as well as the economic managers, in the shops.

Still another urgent problem, which now goes into all growth and is even connected with educational work, is the problem of the economical expenditure of all types of resources. Your plant is coping with the plans in regard to economizing, but still a great deal will have to be done in regard to the better utilization of metal. Metal has been and remains an important component of our national wealth, the bread of industry, one of the "foundations of civilization". Its more efficient use is a nationwide task, the speaker emphasized.

The management and the party organization of the plant must ponder these questions carefully and take measures to bring about a sharp increase in the coefficient of metal use. This is one of the most urgent tasks not only of the enterprise, but also the industry as a whole.

A well-adjusted production impels everyone to subordinate himself to the work rhythm and to the demands of the business at hand. Poor labor organization and idle time demoralize at times even good production workers. This is why order and discipline in everything are needed in every shop and in every department.

These demands were sounded with particular force at the November (1982) Plenum of the CPSU Central Committee in the speech of Yuriy Vladimirovich Andropov at the meeting with the machine builders of the Plant imeni Sergo Ordzhonikidze.

In every subdivision a moral and psychological climate must be created that will give rise to the aspiration to work better, more productively, that will create a situation of creative work and of intolerance for lack of discipline and irresponsibility.

Our entire ideological and political activity among the masses is called upon to create precisely such an atmosphere. Quite a bit has been done at the plant in regard to the improvement of the ideological and educational work, the formation of a Marxist-Leninist world view among the workers.

At the same time, not all possibilities in this most important party cause are being fully utilized. In some shops the educational work is suffering from formalism, is being conducted without regard to the specific nature of the tasks being solved by the collectives, and exerts a weak influence on the activeness of the workers. Not everywhere is the vanguard role of the communists being secured in production.

All of these things are our imperfections in the sphere of the education of people. For this reason the party organization of the plant must increase the level of ideological and educational work in the collective and at the place of residence and bring it into line with the demands of the June (1983) Plenum of the CPSU Central Committee.

Labor education is carried out most effectively in the production brigade. In your plant approximately 70 percent of the workers are united in brigades with a school of office and trade apprenticeship, thereby good conditions have been created for the entire process of education. And broader use must be made of these possibilities to exert collective influence on those who are in need of this.

We must now approach competition among the workers in a new way, direct it increasingly more toward the attainment of high qualitative indicators, constantly improve the forms and methods of competition among labor, and get rid of formalism.

In conclusion, the speaker expressed his conviction that the party organization of the Plant for Transfer Machines imeni 50-Letiye SSSR will successfully fulfill the tasks set by the 26th Congress and the June (1983) Plenum of the CPSU Central Committee, will exert the maximum efforts in the noble cause of communist education of the workers, and will skillfully mobilize the collective for the fulfillment of the plans for 1983 and the five-year-plan in general.

\* \* \*

It is not for the sake of nice-sounding phrases and loud words that we, the communists, go out on a platform. It is our duty to analyze profoundly and self-critically the work of the party organization, to subject to strict measurement the results of our work with the requirements presented to every communist by our party.

These words by the milling machine operator at Shop No 5, A. V. Puchkov, became the leitmotiv of the speeches of the communists who took part in the discussion of the report.

For a little less than 20 years I have been working at the plant, said the speaker. During this time it literally found a new life. Modern equipment, machines with numerical programmed control, a machine-processing center, and the main thing--our remarkable cadres of workers, engineers and technicians made it possible for us to achieve a sharp increase in labor productivity. The shop overfulfilled the plan of the first half year and more than once captured prize-winning places in socialist competition under the slogan "Honor and Glory--Through Work!"

But in our path, the speaker continued, there are still quite a few pits and bumps which prevent forward movement. For example, there were many discussions about the difficult situation with casting, but the cart, as they say, is there now. This leads to the necessity of readjusting the equipment, to the destruction of the work rhythm, and to the increase in rejects. We, communists, cannot look at this with indifference. The same may be said about the frequent changes of the designs of parts and units introduced by the designers, which leads to the unjustified and superfluous expenditure of funds.

We, the workers, are thinking not only about the present, but also about the future of the plant and shop. For this reason we regard it as necessary to decide already now the question of the expansion of the production area of the shop. If this will be done, after having installed more modern equipment and having introduced the brigade form of labor organization, we will regularly supply the assembly shop with our production. Our collective has sufficient manpower, knowledge and ability to carry out the most complicated tasks.

The head of Shop No 4, K. D. Stafidov, told in his speech about how the communists of the shop party organization are replying by deed to the decisions of the June (1983) Plenum of the CPSU. The plant radio constantly reports on the successes of the advanced workers and the most interesting events in the life of the plant. And nevertheless this channel of information is inadequate. The time has come to think seriously about the creation of a large-circulation plant newspaper. This is what it will tell the workers. To take up the brigade form of labor organization. At present hardly more than 60 percent of the workers and pieceworkers in the shop are encompassed by it. But this is not the limit. The collective of the shop is hoping for more active assistance on the part of the appropriate services of the plant in the explanation of the advantages of the brigade form of work.

At the June Plenum it was noted, the speaker continued, that scientific institutions are called upon to extend more effective assistance to production in

the solution of practical tasks. But here the deadlines of some research projects being conducted by scientists of Moscow State University imeni Lomonosov have been obviously delayed. The shop is in need of technical reequipment and the replacement of morally and physically obsolete equipment.

P. A. Abrosov, a fitter at Shop No 6 and a tutor of young people, devoted his speech to the education of the work shift.

A very true idea, he said, was expressed at the Plenum by the general secretary of the CPSU Central Committee, comrade Yu. V. Andropov: "A good means of education is the combination of study with productive labor." Life itself shows that this unity must become still stronger. I am getting used to the graduates of the SG [not further identified] Professional-Technical School-36 and involuntarily compare them with my age cohorts. The young workers of today are technically literate, they are quickly included in the rhythm of production. But, as they say, there are no rules without exceptions. These exceptions trouble us. No, no, you do see loafing young workers without anything to do. One encounters passive members of the All-Union Lenin Young Communist League among them. This is where we, the tutors, try not only to teach our shift professional mastery, but also to inculcate love for work and to pull out from their souls the weeds of egotism.

We are saying the following: "Work, strengthen yourself in labor, demonstrate what you are capable of doing. Then no one will blame you for claiming your share of the wealth of society." I believe that the party committee of the plant is fully capable of organizing more effective patronal assistance in the matter of the education of our shift.

A continuation, as it were, of the talk about the work with young workers was the speech of the deputy secretary of the plant committee of the All-Union Lenin Young Communist League, T. N. Polyakova, at the meeting. In some members of the Komsomol, she said, a sufficiently high professionalism still exists side by side with political infantilism, with a consumer attitude to life. We cannot overlook this. You know, at the plant one-third are young workers. How can the effectiveness of the ideological work of the Komsomol organization be measured? Above all, by the participation of the young people in the labor affairs of the collective. This is why we decided to hold meetings of the members of the Komsomol-youth brigades in the primary organizations, at which the initiative "To the 11th Five-Year-Plan--A Stable Structure of Komsomol-Youth Collectives, the Highest Labor Productivity and Labor Discipline" will be discussed. The plant youth must have someone to follow as an example. Here, for example, you held a Komsomol Youth Subbotnik, dedicated to the 80th anniversary of the 2nd RSDRP [Russian Social Democratic Labor Party] Congress. On this day, the brigade of Yuriy Starshinov, the lathe operator Sergey Chebaturkin, the metal workers Gennadiy Kharlamov and Aleksey Kalinin, the milling-machine operator Nina Proskurina and many other young workers fulfilled one and a half shift tasks each. These kids have truly passionate Komsomol souls and golden hands.

L. P. Veshnikova, head of the party office, shared her thoughts on the organization of party studies at the plant and its relationship with practice. She noted that during the past academic year students carried out about 500 practical tasks in regard to the analysis of production and mass-political work.

Quite a number of things have been done at the plant to improve the forms and methods of ideological influence. And nevertheless there are still many unsolved problems. From year to year there is discussion about communists who are not pursuing their studies actively, skip them, and do not have the ability to work independently with the literature. The plans for the ideological and theoretical growth of communists are frequently still violated by formalism, and the party organizations do a poor job of controlling their quality. Boring and uninteresting studies are still frequent. Some propagandists have a poor command of the methodology of propaganda work. The tasks set by the June (1983) Plenum of the CPSU Central Committee in the sphere of the improvement of ideological work and political work among the masses demand, from the party organization of the plant, greater attention and initiative, and the practical implementation of the decisions being adopted.

This idea was also supported in the speech of the head of the bureau of the department of the chief process engineer, L. P. Ivanenko. Indeed, the level of some lectures and reports does not at all satisfy the interests of the students. For this reason the party committee of the plant has a great deal of work ahead of it in order to kindle the hearts of people and to attune them to the full devotion of their strength in the interest of production.

V. P. Shcherbakov, the director general of the Association for the Production of Transfer Machines and Special Automatic Machine Tools, who entered into the discussion, noted that the plant always found itself at the advanced frontiers of technical progress. It was here that, for the first time in Soviet machine building, not uncoordinated transfer machines, but entire complexes and automatic shops were first produced. During a quarter of a century, more than 800 transfer machines and 10,000 special machine tools were manufactured at the plant. This made it possible to free 20,000 workers and to obtain an annual economic effect of 70 million rubles. Many items are turned out with the State Emblem of Quality.

The results of the production activity, the speaker noted, could be still greater. This is being prevented by breakdowns in the rhythm of work, by mistakes in the solution of design and technical problems.

These shortcomings can be eliminated and new, complex problems can be successfully solved only if every staff member will perceive the production tasks as his own personal ones.

Along with the production and technical tasks, the social problems are being successfully solved at the plant. All work stations have been equipped in accordance with the requirements of the scientific organization of labor, and the production premises and equipment correspond to the norms of technical aesthetics. All of this brings visible fruit: Personnel turnover is being reduced and there is an increase in the level of labor and production discipline.

The demand of the June (1983) Plenum of the CPSU Central Committee concerning the unity of ideological-educational, political, organizational and economic activity, said the speaker in conclusion, must become the guiding principle of

the entire activity of the collective. The party organization of the plant possesses everything necessary to realize these demands successfully.

\* \* \*

The resolution that was adopted outlined a broad range of measures in regard to the practical implementation of the decisions of the June (1983) Plenum of the CPSU Central Committee, set forth in the speech of comrade Yu. V. Andropov, the general secretary of the CPSU Central Committee.

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## INDUSTRY PLANNING AND ECONOMICS

### PLANT DIRECTOR CALLS FOR GREATER ECONOMIC AUTONOMY

MOSCOW PRAVDA in Russian 29 Jun 83 p 2

[Article by USSR Supreme Soviet Deputy I. Yashkin, director of the No 3 State Bearing Plant, under the heading "Economic Thought: Initiative and Enterprise": "From the Director's Viewpoint"]

[Text] In studying the materials of the June Central Committee Party Plenum, the question comes to mind: has everything been done to improve plant operations? And I am not satisfied that it has. Too much time and effort must be spent leading the enterprise down a winding path through piles of indicators and all manner of reporting. When I look back, I unwillingly see much wasted energy and painfully little done. Can we work more effectively? Of course, if without interference. And I unwillingly conclude that imperfection in the economic mechanism is hampering us. What form does it take? First, it prevents us, by damping economic initiative, from carrying out party economic strategy faster and better and from improving production efficiency.

How many, many indicators, plans and reports we have tried! How many reorganizations, and what an enormous amount of time and money has been spent on them! But production efficiency has risen less fast than was demanded.

The term "economic mechanism" consists of two words. The first is born of the concept "to manage," that is, to be one in care of, in charge of, a task, to dispose of the available funds competently and sensibly. Is that how we always act? Instead of granting collectives greater economic independence, one observes a trend towards greater regulation, towards expanding what is already a cumbersome system of plan indicators which bind the enterprises "hand and foot." The number of indicators is growing, and their very abundance seems a guarantee that some of them will unavoidably not be met, as the indicators are sometimes not coordinated with one another. Also impossible is the situation of the complex mechanism that is the modern industrial enterprise, in a Procrustean bed of scores of control points.

Form 1-C, so-called, is a graphic example. Whereas there were 29 indicators in the monthly net cost reporting form approved by the USSR Central Statistical Administration on 2 July 1979, this year there are 75. The quarterly reporting form has been increased from 92 to 200 indicators.

Or one other fact. A wage fund expenditure indicator is part of the industrial output production reporting (Form II) which is to be submitted by the third of each month. Any economist knows that wage fund expenditure reporting is done only on the 7th, as the whole method of calculating and recording it is adjusted to that date. What would be the reliability of an indicator if it had to be "thought up" on the 3rd?

The periods for submitting the very important indicator of volume of output marketed, with consideration of performance of contract obligations, are also unrealistic at present, especially for enterprises with many customers and large products lists. There are similar absurdities in other reporting sections.

At the same time, the flow of information being demanded by local agencies has increased significantly and is not anticipated in any regulations. Moreover, ministries and all-union industrial associations are constantly requesting data, allegedly to meet the needs of their own computer centers.

The impression is created that enterprise leaders are not completely trusted, that they are considered incapable of independently performing their basic tasks and obtaining the necessary result. Hence, the petty, unneeded surveillance, the cumbersome monitoring, which plays no sufficiently justified organizational role and only diverts people from their work. In fact, a large number of ministry specialists, numerous institutes and the enterprises themselves are employed in collecting and processing enormous amounts of data.

One would think the motive force in actually increasing the efficiency of any collective would have to be a few clear directives, rather than hundreds of indicators, that it would be the actual interest people have in obtaining the highest end results. Only then could we operate economically. Only then would the plant not spend a single ton of metal unnecessarily or acquire equipment it does not need or begin construction when existing shops are not operating at capacity.

I think we need to arouse collectives to improve production efficiency not administratively, but economically. In this regard, a recent PRAVDA article entitled "Independence" correctly perceived the problem. But we have thus far observed the opposite picture in practice. Let's say the results of enterprise production-economic activity are evaluated exclusively in terms of fulfillment of an approved plan. That is, we initially draw up a plan, without the proper substantiation, and then begin adjusting it to the necessary level. But if we miscalculate, then there is a rush to make numerous corrections, which harms the economy.

To say the plan is law is correct. And if it is law, it should not be changed every week. For example, production quotas were adjusted for a quarter of our plant's output last year. To meet them, we were forced to change our orders for metal. The result? Thirty-five of the 49 metal sections changed in the order were not produced, so we were not able to meet orders for 39 of the 57 bearings in the products list.

In my view, when summing up the results of economic activity, fulfillment of the basic technical-economic indicators, and foremost the products-list delivery

plan, should be the only mandatory condition for a positive evaluation of plant operation. And let the evaluation itself, and the amounts of deductions for all incentives funds and bonuses as well, be based on the actual improvement in basic quality indicators. Deliveries to meet orders, increased profit and improved labor productivity should be included in these indicators. In this instance, incentive funds would be calculated dynamically: If you have worked well, you will receive a significant increase; if poorly, a large portion would not be calculated, perhaps none at all.

One insistent demand being made by the present is for continuous production improvement, for continuously better quality. Enormous sums are being spent on retooling. Prospects are for even more to be spent. But do we always obtain the proper impact from introducing, let's say, new equipment?

This is what actually happens. In order to receive this equipment, and especially special equipment, orders must be placed several years in advance, when an enterprise cannot know if it will have sufficient funds, since the amount of funds available to it is set at different levels each year. For this reason, we often have a discrepancy between the cost of equipment in contracts and levels of financing. This also happens: the initial models of new machine tools yield poor results. You refuse to accept them until they are brought up to standard. But you can't take a year to straighten it out, because you will not meet the capital investment plan and that portion of the funds will not be carried over to the following year, meaning it "disappears." Still, the equipment is brought to the plant. Sometimes we get units we could do without entirely, but still, large sums are spent on them.

What is the solution? An enterprise leader probably needs to know several years in advance what opportunities he will have to acquire equipment and for funds not spent in one year to be carried over to the next. Withdrawing them and then re-allocating them is inefficient. If equipment is not acquired, this should not be viewed as a plan violation, but as a savings in funds, on the condition, of course, that assignments for increasing production capacity are met.

In this instance, depreciation deductions could be a constant source of financing, but on the condition that it be established in the legislation that such deductions not be redistributed. For machinebuilding enterprises, where fixed assets are up-dated comparatively quickly, this is, I feel, simply a necessary premise. Only under such conditions can a plant try to raise the organizational and technical level confidently, with long-range planning, without sticking its hand in the state's pocket all the time. It would resort to budget financing only for radical renovation or considerable production expansion.

Production capacities could be increased and major steps taken to improve the quality of output being produced and to master the release of new output or to raise the technical level of production through additional profit as well, that is, to increase them as compared with the level in the preceding year. If some portion of this increment in profit were left at the disposal of the enterprise, it would also be a guaranteed source of additional deductions to incentives funds.

And the very presence of additional profit is a consequence of an increase in enterprise yield, of improved work quality. But, in striving to increase that portion of the profit, the plant will unavoidably seek out internal reserves and make better use of its own opportunities. The state can only gain from this.

I should think this proposed broadening of the economic independence and responsibility of enterprises would considerably facilitate improving our operation and would help put an end to the mood of dependence of certain enterprise leaders, since their well-being would be in their own hands and they would not have to wait for "manna from heaven" from the ministry.

Increased enterprise responsibility should, at the very least, heighten the role of superior economic, planning and supply agencies as well. Let them assume the bulk of the responsibility for carrying out party and government resolutions on improving the economic mechanism. In this connection, I should like to note that the central economic departments have not hastened to express their opinion in the numerous articles in the periodicals. Why do the USSR Central Statistical Administration and Gosplan not respond, for example, to the issue raised repeatedly in the press of the multiplicity of indicators in reporting and clearly state how specifically they intend to respond in this direction?

All ways of perfecting the economic mechanism are unified by one large goal, that of reducing the consumption of resources, lowering output cost and achieving excellent economic indicators. That is also what the unified efforts of industrial enterprises and higher economic management agencies should also be oriented towards as well.

Let's recall a time when there were few plants and one could count on his fingers those enterprise leaders who were competent. At that time, rigid centralization and strict regulation of managerial activity were possible and necessary and served to further our development. Times have changed. There are many, many enterprises now and our personnel have grown technically and economically. The party has armed leaders with an economic strategy. But they can and must solve its tactical tasks independently. A commander, both on the field of battle and in a management career, simply must choose and use his tactics as circumstances dictate -- that is the key to victory.

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CSO: 1823/84

CONTINUED PRODUCTION OF OUTDATED MACHINE TOOLS CRITICIZED

Moscow IZVESTIYA in Russian 30 Jun 83 p 2

[Article by Anatoliy Agranovski: "Pictures From an Exhibition"]

[Text] An exhibition was opened at the edge of Moscow, at the workers' gate, in Karacharov. It called forth intense, but not wide, interest. People came alone, in groups, but all experienced people--plant directors, designers, scientists, and ministers. If I am not mistaken, among the inexperienced ones I was the only one.

I saw machine tools, lathes and milling-machines. Their distinction lay in the fact that all of them operated with ChPU [numerically programmed control]. They performed calculations and measurements, they possessed a memory, and they were able to learn on their own--by which, it goes without saying, I do not hope to surprise the reader.

Approximately a third of a century ago it was possible to be surprised. At that time I was assigned an article in a newspaper about the bourgeois pseudoscience of cybernetics. And professors were found who maintained entirely on scientific grounds that a machine is not capable of "remembering" and "thinking". But nevertheless I did not write the article. Fortunately, I already knew that I must listen to the opposite side, I searched for another professor, a doctor of mathematics, a bitter old man, and he told me: "Young man, remember, the machine can do everything. There is only one thing the machine cannot do--be riff-raff."

The machines which I saw now could do a great deal, if not everything. They turned cones, spheres, and super-complex threads. They were not characterized by the stupidity of the simpleton-machine, which always makes one and the same thing. It makes things faultlessly and rapidly, and this good for large series, but in our country they account for up to 25 percent of production, but small-series and piece production--for 75 percent.

For the sake of individual parts, it is clear to everyone, there is no sense in undertaking automation. It is simpler to manufacture them manually. But here a peculiar contest was held: One and the same task was given to a lathe operator of superior rank and to a machine with numerically programmed control. The lathe operator at once went to work and easily passed the machine, which the operator had to adjust, supply with the program, etc. He went ahead by up to 10 parts, but then hopelessly fell behind. These machines, while preserving universality, automate small series--their second distinction.

The worker here (this we must remember) is free most of the time. He mounts a black blank--and then removes a splendid part. Moreover, one of the machines does not even require this: The simplest robot-manipulator was attached to it. The only thing that remains to be done here is to pile up the necessary number of blanks before the third shift, push a button and turn out the light. During the night the machine itself will carry out the task.

Such is this exhibition, and now we are entitled to ask: What in it is new in principle? I will answer: Nothing. Perhaps the machines were chosen from the latest ones? I will answer: They are at least 7 to 10 years old--that is the third distinction. To invent the new is flattering, newly erected buildings are in favor with everyone, they are efficient, but in our age the reconstruction of old plants is more efficient--a subject about which I already had the occasion to write. Today we are talking about the modernization of old machines. A gigantic problem.

What is the most common announcement in our country? "Wanted. . ." Wanted are lathe operators, wanted are milling machine operators--this is what you see in any city, in any passage. But perhaps it is sufficient to be moved by the shortage of workers. Perhaps it is time to talk about the "unemployment" of machines.

The USSR Ministry of the Machine Tool and Tool Building Industry is located next to IZVESTIYA, the next house on Gorkiy Street. Minister B. V. Bal'mont said: "In your print shop machines are also standing idle." "How do you know this, Boris Vladimirovich?" "Every day on the way to work I see: "Wanted are . . ." I will be self-critical: A hundred times I have gone past, but I got accustomed to it, I did not notice.

One can, of course, in every individual case search for the guilty ones; but there are general figures, and these you do not dismiss. All in all, according to the minister, there are several million metal-cutting machine tools in our country. The largest inventory in the world. But there are 0.59 machine operators per machine in industry. Half a person. The shift system coefficient is 1.29. In other words, they work, where they work, primarily in one shift. At one-third of capacity.

The last all-Union machine census was in 1972. They are registered, like people. At times round-ups are organized to ascertain the negligent: "A 24-hour inspection" on 19 May of the past year showed that in 11 machine building industries 257,000 machines were idling. Up to now they have not been taught to be critical, they do not go on smoking binges, and they are not drunk--but how do you know? The possibilities of progress are really unlimited.

What are our managers doing? They are constructing new plants, without having put in order those which they have. They demand new machines, not having utilized the capacity of their machines. And in this five-year-plan the Ministry of Power Machine Building alone planned to reduce equipment by 5,153 units. Other departments want to "grow" at any price.

I foresee the objection of those who know everything better than anyone else: We need reserve capacities. The machines stand for the time being, but they will have to begin to turn. However, reserves are not only technical equipment, but also skilled personnel. The demographic situation is well known: There will not be more people. In their present form, these machines will not begin to turn.

Their idling is not better than the idling of people. Worse. Ore was extracted, cast iron was smelted, steel was welded, it was transported for miles and miles, there was the work of metal workers, power engineers, construction workers and railway workers, yes and all of them had to be fed, taught, and provided with medical care--these machines contain a particle of the work of almost everyone of us. And here social labor is frozen. And you say, someone came 15 minutes late.

The exhibition in Karacharov shows the way to the solution of the problem. More precisely, I will be careful, one of the ways. New methods of metal processing must be introduced after which it is quite useless to remove the shavings. We must end the practice where every plant, every kolkhoz, and every printing shop makes its own spare parts, cotter pins and bolts. Their output must be centralized, turned out in quantity production, intensifying specialization--we know everything and have "studied" everything. But we implement it slowly because it requires enormous capital investments.

Therefore, not a panacea is proposed, but still another version, one which is economical and marketable. If there are not enough machine operators, they must become multi-machine operators. In the textile business this became a practice long ago, but for lathe operators and milling machine operators it has not come easy it seems. Now, we have noted, the worker is free. Everywhere he operates 2-3 machines with numerically programmed control. And, the main thing, he turns out the highest quality. The preciseness of metal work, even in the hands of yesterday's schoolboys, becomes first-rate. "An advanced inventory can be quickly set in motion," Minister B. V. Bal'mont told me. Bring the equipment which already exists in the country up to the modern level.

A major overhaul of the machines, you must know, has been authorized all the same. After it they still could work for a long time, but, in addition to physical wear and tear, there is moral wear and tear. This became especially clear after the new programmed machines came off the assembly line: Already we are producing more than 10,000 of them per year. And here the bold thought appeared--to give the old machines "a higher education" in the course of their repair.

The Soyuzstankoremnaladka [All-Union Association for the Repair and Adjustment of Machine Tools] was assigned this task. Its head, Yu. P. Sagenyuk, and the chief engineer, V. I. Tarnovskiy, asked me to write that they did not discover America. For this reason I will omit the stage of the inevitable arguments, initial trials and errors, consultations with scientists and defense of the plans. I will proceed directly to the business at hand.

The old machine is preserved--you understand the economy. Of 1,500 units and parts approximately 200 require replacement. But the remaining ones, are they worse than the new ones? Better, I was told. They have gone through a process of natural aging, they have become more durable. For the sceptics, who believe only in what has been tested elsewhere, I will add: In the United States there are firms which buy up old equipment and, after having supplied it with numerically programmed control, sell it very advantageously. And the capitalists, as is well known, do not spend money for nothing.

In the association there are 10 small plants (with 500-600 workers each), but from the very beginning they planned their work solidly. Let us say, Mosremstanok [Industrial and Technical Establishment for the Repair of Metal-Cutting Equipment of the Administration of Machinery Manufacture of the Mosgorsovnarkhoz (Council of the National Economy of the Moscow City Economic Region)] has mastered complex "ball-bearing pairs" for all of its fellow enterprises; I saw this factory, I saw the finished products with the personal signature of the foremen. The Sumy Plant mastered oil pumps, the Michurinsk Plant--friction clutches, and the Tula Plant--tool heads. . .

They have gone beyond tinkering, they were able to make these units with the aid of the same programmed equipment, and as a result each of the renovated machines has already been produced in 80-100 units, they are working in the plants, here we are not dealing with theoretical proposals, but with living practice. It is important to me to emphasize this because in our country the specialists multiplied a bit too much, resembling the husband of the metal worker Poshlepkin: As is well known, he was not fit for anything. They know how to discuss and argue as much as you like, they can explain everything, but when it comes to doing things--paralysis. Here they gave people a task, and they carried it out faultlessly and on time.

The machines were not made for the exhibition. As a matter of fact, it came about inadvertently. It was necessary to present models to an inter-department commission, they brought them to Moscow, and, once brought together, they became a phenomenon which you already do not disregard and leave out of consideration.

"From the new, they will always return," said Sergey Kostin. "But like it or not, it will have to be."

He is a strong fellow, a well-formed worker by birth, a native of Tula. As long as he remembers himself, he saw the plant before his eyes. ("Like the subway for you," he told me). In the army, serving in the rocket units, he became acquainted with electronics, at the plant he became a milling machine operator of the highest grade, he was sent to the all-Union competition in Leningrad, he took fifth place there. I mention this in addition to the fact that he was already a foreman when he was invited to change jobs and become an adjuster for machines with numerically programmed control.

The inertness in science is well known, but there is conservatism also among the workers. Kostin earned up to 250 a month, his friends said: "Let well alone". They said: "You will break down!" Indeed, he had to settle for a

wage--140 rubles. And he had a son already. But after half a year Kostin was transferred to a "deal", now he earns no less than 300 a month. The arguments have disappeared, and he, very likely, is proud that in his line of work he is the first among his comrades.

They already have two dozen programmed machines, and he alone does the adjustment. Young girls are working, and they are stormed with applicants. A program has been established in the bay of the Ministry of Instrument Making, Automation Equipment, and Control Systems (for experts: H22-1M). No one, besides Kostin, has the right to get into this grey, waist-high cupboard. He is mastering encoding: If the tape breaks, it can be restored. Will he go on in his studies? He has completed the evening tekhnikum, now his wife has enrolled, for both of them at once it is difficult. And there is no need. He likes his work, he is getting along well, what more?

Most of all I was interested in the attitude of the workers themselves to this technology. Are they not sorry about the loss of their workmanship? The Muscovite Viktor Timakov demonstrated the programmed equipment of the next generation (NTs-31). He previously worked as a metal worker and fitter, in the army he was a member of an airborne unit, he has 45 parachute jumps. A handsome lad, quick in his deductions, venturesome, it seemed to me.

A new microprocessor was built into the machine, information is fed into it from a keyboard. Timakov ran his fingers with ease across the keyboard, even with some ostentatious dandyism. When he "wrote" the program, he made calculations on a pocket calculator, but all the serious mathematics are concealed in the machine. He, for example, assigns the step of threading, the length of the thread, but the number of transitions and the optimal mode, it selects itself.

Was it easy to master this work? He replied that he has taught about 10 people already. All of them young lads, after the vocational and technical school, after the army, they simply had to overcome a psychological barrier. Is a secondary education sufficient? Entirely. He himself entered the institute, advanced to the third course in evening school, but dropped it: It is difficult to combine [work and study], and he is not inclined to change his profession. It is empty talk that engineers are needed everywhere. What is better--the microprocessor or the "cupboard" I was convinced: Timakov will stick through thick and thin to his machine. But he said that the bay [stoyka] also has an advantage. What advantage? You do not force the tape to turn more rapidly. The program there is "iron". But here you can change it. And there will be those who wish--at the end of the month or the quarter--to deliver something "above-plan" at the expense of violations of technology, to the detriment of quality. Though, of course, to introduce a correction is interesting, if it makes sense.

We talked in the shop, then at home, in a cosy two-room apartment, where Timakov lives with his wife and their little daughter. Very well, I agreed with him, he is an adjuster, he has creative work to do. But the others, who simply operate the machines? Timakov thought about this: The majority of lathe operators today, too, are "operators". The same gear-wheels and flanges are driving. The machine frees them from routine work. But there are few real universals. There is a catastrophic shortage of them.

And in general I understood, there is no need to worry about the aces: For them there will always be work. There will be individual assignments, there will be first models, which, by the way, are necessary also for the composition of programs. But, it is clear, a skill slips away if it is not needed. Most startling of all in the Chkalov flight over the North Pole to America was the fact that for 63 hours the pilots did not let the steering control out of their hands. Now this is superfluous: There is the automatic pilot. And not a single one among the pilots would in any way be sad about this. New skills come to replace old ones, and other aces flourish, but mastery is ineradicable. I liked how these two young workers conducted themselves at the exhibition, how they demonstrated the machines, how they answered the questions of the visitors, not being intimidated by their high ranks, preserving their feeling of personal accomplishment.

"Machine 16-K20," Kostin said, "is a universal, lathe-boring machine. Is it profitable? Judge for yourself: A new machine of the same designation, also with numerically programmed control, costs 32,000, but ours--20,000."

"Well, if you are going to take one, then a new one is better," one of the ministers objected.

"If the money is not yours," said Kostin, "then it is better."

Technically the problem may be regarded as solved. By the end of the five-year-plan, the All-Union Association for the Repair and Adjustment of Machine Tools will restore 600 machines a year. But their total number (only selected types, only subject to modernization) comes to 60,000. The arithmetic is simple: This little task is good for 100 years! What is to be done? One of the variants is to develop the association. Up to now it does not have one plant beyond the Urals, and how much does it cost to transport a machine from Vladivostok to Moscow? Moreover, modernization is a permanent thing. You must not think that you carry it through once, and that is all. It was estimated: In order to perform work constantly, in order to return the equipment "ready to operate", it is necessary to build another 40 repair plants in the country. This is not done quickly.

Another path is to turn the projects over to the ministries and them do it themselves. Every one of them has repair plants, this is within their power. But there must be a sharp increase in the output of model units, programmed equipment, and here you will not manage with spontaneous activity only. Materials are needed, limits, funds, and modernization must be written into the plan of the ministry (it would be good if it would not be put off, but would get underway beginning in 1984), they would have to be able and to want to fulfill this plan--which path is shorter? . . . Here we will appropriately cite the words from the speech of Yu. V. Andropov at the June (1983) Plenum of the CPSU Central Committee: "To develop a system of organizational, economic and moral measures that would interest both managers and workers, and, of course, scientists and designers, in the restoration of technical equipment, that would make work after the old fashion disadvantageous--this is the essence of the task."

I did not have the opportunity to say: At the exhibition the Soviet-Yugoslav LYUMO [not further identified] was demonstrated. A black little suitcase with a bright panel which computed, remembered and "saw"--the most delicate divisions on glass lines. It worked "in the mode of a pilot": It indicated to the worker where to direct the cutter and when to remove it. It even cheeped at that moment. I was troubled by such subordination of the individual, but, it turned out, they like to work with LYUMO. The young kids are learning to "catch the hundredths", this rare skill already no longer has to be gained in dozens of years. There is a sharp increase in labor productivity, but the most interesting thing of all is the fact that the modernization itself has been simplified here--it is produced on the spot, during 24 hours.

The time has come to weigh all variants wisely. The time has come to put economic levers into operation properly. So that funds made available for equipment to plants and ministries become "theirs" for them. So that nothing is purchased without a purpose, but having bought [something] they make full use of it. So that they fight for advanced technology.

"This we have not yet found," L. N. Snovskiy, the chief of the Department for Machine Building of the USSR Gosplan, told me. "The pressure for machines is terrible, from all sides we hear: 'Give!', but they order mainly old ones, and with numerically programmed control--least of all. Of course, 'all sorts of modernized automatic machines are needed', but why is that so? Because as yet no one has suffered materially from idle time. We tried to introduce payment for funds--6 percent. And so they included the 6 percent in the plan for the plants, so there were funds with which to pay them.

The science of economics, as it has become accepted to write, is in debt here. And really in debt: There are no profound elaborations, no recommendations that could help the managers. Meanwhile, dilettantism in any matter brings harm. Here and there, in pursuit of the fashion, they began to scatter about machines with numerically programmed control: One--there, another one--here. But the economy of labor expenses in this case is imaginary. We free the worker, let us suppose, but engineers, electronics experts and programmers are added.

I was recently in ENIMC [Experimental Scientific Research Institute of Metal-Cutting Machine Tools], a scientific center of our machine building industry, and the director of the Institute, V. S. Belov, especially emphasized: "The new machines lend themselves excellently to insertion in the brigade method of work. They require order in administration, planning and supply. But chaos does not yield to automation. To use machines with numerically programmed control in one shift is perversity. Where they are gathered into sections, there they work without a hitch, but where they are spread out singly, or in two's, there they stand, discrediting the idea.

The less you know, the simpler everything looks. But the whole point is that in undertaking a large endeavor, one must look far ahead. For the state it is an excessive burden to invest such funds and not receive full return. Besides everything, about what was it said, the service and accurate operation of transfer machines and machines with numerically programmed control is necessary. So that, because of some kind of electronic hitch involving kopecks, units should not stand idle for which tens of thousands of rubles were paid.

I am writing a review of an exhibition and am glad to note that its organizers also thought about this. In a corner there is an "Gazik" [car produced by the Ul'yanovsk Automobile Plant], a small automobile, packed with instruments and electronic "plates"--first aid for new technology. And a map of the USSR hangs there, on which in the most accurate fashion the future "interconnected base centers" are pictured. They are supposed to serve the enterprises of entire regions, they will eliminate any failure within 24 hours.

We will say directly that the creation of such a network will also not be free of charge, but without it everything becomes senseless. Here, too, capital investments are necessary, but they are immeasurably smaller than the price of the unemployment of millions of machines. The map, I understood, described the dreams of sensible people, [but] it is to some degree a phantasy. But once again the exhibition in Karacharov, at the edge of Moscow, convinced me that a phantasy does not stand in the way of a cause. Dreams do not argue with efficiency. It is idleness which stands in opposition to it.

8970

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## INDUSTRY PLANNING AND ECONOMICS

### TBILISI STANKOSTROITEL' ADOPTING NEW MACHINE TOOLS, OVERCOMING LAG

[Editorial Report] Tbilisi KOMUNISTI in Georgian on 4 May 1983 page 2 carries Sh. Amashukeli's 1100-word article on Tbilisi Stankostroitel' Association's successful efforts this 5-year plan to overcome the lag it fell into starting in 1977, mainly thanks to new leadership, better cadre practices, and in particular the installation of new machine tools to produce new product items as part of the association's contribution to scientific-technical progress. One such item is the adoption of the 1M63d screw-cutting machine to replace the old 1M63 (the new one itself is slated to be replaced by the end of this period). Cadre problems have been alleviated substantially through better selection and training as well as efforts to "reawaken dormant patriotism," also vigorous housing construction efforts (despite the outfit's rather tight financial situation): figures are given on new multi-unit housing complexes built in the past couple of years or scheduled for completion soon.

There is brief reference, as well, to the association's Food Program efforts, in particular auxiliary farm operations worked by Stankostroitel's units in Marneuli Rayon.

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## METAL-CUTTING AND METAL-FORMING MACHINE TOOLS

### HOW TO IMPROVISE START-UP OF NEW 55-TON ROTARY MILL

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian Jul 83 p 1

[Article by mechanic V. Bondarenko, "Why a Novelty Does Not Please"]

[Text] Valentin Vasil'yevich Bondarenko has worked at the Saratov Machine Tool Building Association for about 10 years. During that time he not only acquired the high skills of a machine-assembly mechanic, but also by his activity, won the respect of comrades who elected him to the shop committee of the trade union. For his great contribution to assimilating the output of machine tools for the KazAZ [Kaza Motor Vehicle Plant], he was awarded the "For Labor Excellence" medal.

The ministry's instruction to us was unexpected. The specialty of the association is gear-cutting equipment. And here we were ordered to organize the production of, to us, an atypical and very complicated product to manufacture -- an "ST-200" rotary mill for machining main journals and connecting rods of crankshafts, -- on a compressed schedule, literally in a year.

"They" -- explained V. Voyevodin, deputy minister, to our managers, -- "are very necessary to tractor and motor vehicle industry plants which work on the food Program. So we considered: Who can do this? You have a strong SKB [Special Design Bureau], good specialists, rich experience in creating new equipment..."

I will not conceal that the collective was pleased to hear this explanation. The demand for our products is invariably great not only in the domestic market, but also abroad. Saratov machine tools are not inferior to the best specimens abroad and, in a number of cases, (a graphic example of this are automatic gear-broaching machines) even surpass them. Over 65 percent of the associations' products, subject to certification, were awarded the state emblem of quality.

Therefore, workers and specialists had no question about whether or not we could master the "ST-200." We only thought about how to best regroup our forces to carry out the task and, at the same time, not stumble in our main direction. Here is the situation.

The moment we received the order, a promising plan began to materialize to raise the technical standard and competitiveness of the gear-cutting equipment prepared for the 11th Five-Year Plan period. Among the main developments were a machine tool with numerical programmed control, semiautomatic and automatic production sections for manufacturing pinions with circular teeth and other progressive equipment. Even the simple enumeration of this equipment gives one an idea of what serious problems the plan poses for SKB specialists and production people. As they say, we hardly have time to turn around.

There was another reason for concern. Our enterprise, advanced in the technical standards and quality of products, has not coped in the past for a long time with the plan for sales. A turning point was planned in the 11th Five-Year Plan period. Specialists finally began to receive bonuses and the wages of the workers were increased. In a word, new equipment whose creation took so much energy and attention, began to bring not only moral, but also material satisfaction. It seemed that the positions won would be consolidated, but along comes the "ST-200"...

Imagine a 55-ton cumbersome object with six cabinets full of electronics, two hydraulic installations, 13 various electric motors with a total capacity of 185 kilowatts, with 11-meter bearings. Imagine the method of encircling milling in which not the part, as is usual, but the tool around it rotates and, finally, rigid precision requirements -- and you will understand our concern.

But a task is a task. Production facility managers and party activists made an effort to bring to the consciousness of each worker and specialist the great importance of the "ST-200" machine tool. It would be able to replace eight special "KZh-189" semiautomatic machines which are now used by motor vehicle and tractor builders to grind connecting rods of crankshafts, provide high accuracy and, therefore, reliability of motor operation. Each machine tool would make it possible to save 174,000 rubles annually; 28 of them must be produced in the current five-year plan period, and hundreds in the future... The people understood: the machine tools must be given the "green light" no matter what.

The SKB specialists under the guidance of leading designer A. Kopylenko and the leading electrician Yu. Kiselev, disregarding their personal time, revised drawings and other documentation in several weeks which were transferred from the Kolonna Heavy Machine Tool Building Plant to make them applicable to local conditions. Orders for shipments of products under subcontracting arrangements were placed on necessary schedules. In the foundry machine and experimental shops, under the unremitting supervision of production chief Yu. Ivanov, "ST-200" parts and units passed through stamped "right out of turn." Technological problems were solved personally by bureau chiefs V. Gararin and V. Lipin of the Leading Technologist A. Krovnyakov's Department. Without exaggeration the entire collective was mobilized for manufacturing the "ST-200."

Regrettably, not everything went smoothly.

For example, a problem came up in manufacturing swivel bearings. At first, it was assumed they would be made by the Kolonna Heavy Machine Tool Building

Plant and the GZ-1 [State Bearing Plant], where appropriate equipment is available. But then the subcontracting arrangements were made more complicated: we were supposed to do the case-hardening, annealing and grinding of the parts and then send them to Moscow, after which they must be returned to Saratov again. How much time and money would be wasted!

We could not test the first two "ST-200" specimens for a long time due to the shortage of electronics supplied to us from abroad. In my opinion, this was also not done efficiently. In developing the production of expensive and extremely necessary machine tools to our industry, it was first necessary to take care of equipping them with domestic electronics. In fact, we are not talking about one single order and about small sums of money.

But the most painful question is to provide the new equipment with cutting tools. As shown by the KamAZ experience, where similar equipment is in operation, very cutting tools of high quality are required, while we are not in condition to complete even two experimental specimens. The reason is that the Minstankprom [Ministry of the Machine Tool Industry] did not give any thought to tools and is not thinking about tools for the "ST-200." Here, judging by everything, their position is as follows: those who need them will find them or will make them themselves. Our business is machine tools. Somehow this is not compatible with a genuine concern about the Food Program.

Actually, as far as our plant is concerned, we have nowhere else to go; we will organize the production of cutting tools. Our specialists confirm that it is possible to do so. But in what quantities? Only to outfit a machine tool and "float" it to the user. And further, what will he do with the mass of good quality wrought metal? Will not our tool stock be found to be expensive and unprofitable? Yes, without fail. There is no need to make all this fuss. This orientation of the ministry appears questionable to us. Would it not be better to create a specialized production facility at one of the existing tool plants? In fact, after tens and hundreds of "ST-200" there will follow, as was explained to us, other machine tools of the same type -- for machining, in particular, camshafts.

...We manufactured and shipped to the user the first two "ST-200," although with great difficulties. Now we are starting on the following ten. The intraplant road, as they say, is already tamped down. It means that manufacturing time will be reduced. But what to do with the ruts and potholes on the other side of the passable road?

2291

(20) 1823/100

## AUTOMATED LINES AND AGGREGATED MACHINING SYSTEMS

### TBILISI PLANT DEVELOPS PROGRAMMABLE LATHE

Tbilisi ZARYA VOSTOKA in Russian 5 May 83 p 1

[Article by Albert Kochetkov: "New Generation of Machine Tools"]

[Text] The 6th Plenum of the Georgian Communist Party Central Committee defined the directions for broad introduction of the achievements of scientific-technical progress in the republic national economy. Serious work is underway everywhere to implement the resolutions of this plenum. Thus, the Tbilisi Machine-Tool Production Association has adopted a policy of updating the entire products list on the basis of a radical improvement in the technical-economic indicators of a new generation of machine tools.

For our information: in 1967, the proportion of equipment in production for 10 years or more here was 16 percent; in 1970, that indicator had risen to 26 percent, and by the start of the current five-year plan, it had reached 30 percent. And a significant portion of that output was metalworking equipment. That is why work on changing over to the release of technically improved new output being done by Tbilisi machine-tool builders is so urgent and significant.

Recently, the association began producing the model IM63D multipurpose screw-cutting lathe. This model has much in common with its predecessor; some of the subassemblies are standardized. However, its technical specifications are considerably superior. Much improvement was obtained by equipping the machine with a 20-percent more powerful electric motor. This increment ensured an increase in rpm in the new model from 1,250 to 1,600.

The economic indicators of the new machine are impressive: labor productivity is 40 percent higher, the weight of the machine per unit of power has been reduced, and its operation saves the customer hundreds of thousands of rubles annually. And the initial economic impact of introducing this machine tool is 10,786 rubles.

"This machine will become the head of a 'dynasty' of a whole series of modifications," says Georgiy Bendukidze, chief project designer in the Tbilisi Special Technological Design Bureau for Machinebuilding. "We are now mastering the release of a similar machine, but with a digital readout for monitoring the longitudinal travel of the support. This is provided by electronics which ease the

labor of the operator and improve machining precision. The productivity of the machine is nearly half again as much as on similar machines. We are preparing the series release of yet another modification.

One other model is being developed on the basis of the most modern achievements of machine-tool building. It was born in the Tbilisi bureau. The new machine is equipped with an operative electronic-circuit control system. However, it should not be confused with numerical preset-control machines. Those machine tools are "charged" with a tape ensuring a prescribed operating routine. That is, a specialist programs the operation. But the Tbilisi designers have taken another route. The lathe operator himself compiles the machine's operating program. The machine has a device similar to an electronic calculator. It suffices to set the operating routine and the machine works any part, even ones with very complex configurations, independently, without human monitoring.

And the lathe operator can make changes in the program while the part is being machined. Moreover, the machine has a "memory." The small-format programming device can be removed from the machine and installed on another of the same type. Without any additional preparation, it then begins manufacturing precisely the same parts as its "neighbor."

The new machine can handle any lathe operations, machining the most complex curvilinear surfaces with high precision. This has been confirmed by the operation of prototypes. But the day is not far off when series production will begin on an automatic lathe with an operative control system.

At the same time, the association collective is preparing to begin producing a new pipe-cutter model developed by the Tbilisi bureau. This will be yet another step on the path of accelerating scientific-technical progress. This innovation is at the level of the best world standards. The machine will be less metals-intensive and considerably more productive. Prototypes are already being tested at a Urals pipe plant.

Series production of the first pipe-cutter models with an adaptive control system has been mastered. What does this mean? The machine is capable of self-adjustment, that is, of stabilizing the cutting force, varying the cutter feed, and so on.

The collective of the machine-tool production association, persistently overcoming difficulties, is more and more confidently adopting a policy of updating its output and improving its technical level and consumer features. This was precisely the approach to resolving economic tasks that was indicated at the November (1982) Plenum of the CPSU Central Committee.

11052

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## AUTOMATED LINES AND AGGREGATED MACHINING SYSTEMS

### AUTOMATED LINES OF PRESENT, FUTURE FACTORIES VIEWED

Moscow ZNANIYE-SILA in Russian No 6, Jun 83, inside cover, pp 1-2

[Article, "Robots Make Robots...Well, What Further? K. Frolov, corresponding member of the USSR Academy of Sciences, director of the STATE NII [Scientific Research Institute] of Mechanical Engineering imeni academician A. A. Blagonravov of the USSR Academy of Sciences]

[Text] Production Facilities Without People -- and Problems Again

What will our enterprises be like tomorrow? The answer is sort of known: automated. Or, at least, with a high level of automation.

At such enterprises, conditionally called "sparsely manned," the number of workers may be a hundred times fewer than in existing enterprises. And the role of a person in them is reduced to developing programs to control computers, and setting up and repairing the equipment.

Evidently, sparsely manned enterprises do not originate in a vacuum. It is first necessary to take the road from comprehensive automation of individual technological links to fusing them into a single automated organism. Such a road makes it possible to combine the final goal with today's problems. At present, it is necessary to increase the efficiency of production by creating automated technological equipment systems. And then these systems will become component parts of sparsely manned production facilities.

Such an approach makes it possible to combine the final goal with today's problems on increasing the efficiency of production, in particular, with the creation of automated technological equipment systems. Therefore, precisely such systems are developed as future component parts of sparsely manned enterprises.

The first sparsely manned enterprise sections have already been created in our country. Enterprises built to use all the latest automation principles may have only a fifth of the workers as compared to traditionally organized production facilities. It is interesting that such plants use industrial robots to create the final product -- also robots. But this is what is important -- technical progress requires constant renovation and improvement of the output. And this means that series and small-series production facilities must become

predominant. And mainly -- they must be highly flexible and be capable of changing over rapidly to the manufacture of new products.

This means that the production facility should have not only very few workers, but also be flexible. This is the requirement of technical progress.

The traditional comprehensive automation is achieved by creating automated flow lines, but this means -- rigid production, limited by the product list, while a changeover to an output of new machines or units is possible only with a considerable expenditure of labor, time and money. As soon as we wish to expand the product list (with full automation of production) we require, unavoidably, a large amount of new equipment, fittings, devices and tools. And, the main thing -- the reworking of a large volume of data related to the organization of a powerful automatic dispatcher service, creation of a data bank for storing control programs and considerable expansion of the transport-warehousing facilities of the enterprise.

Thus, a sparsely manned enterprise cannot provide a broad list of products. A dead end? Another paradox of technical progress? Of course, economic considerations intervene here. An increase in product diversity for a constant capacity of the enterprise leads to a reduction in the volume of the series of each particular part, while making special equipment for small-series production (don't forget -- this series will continue to decrease and decrease in volume as the product list increases) makes no sense and is economically absurd.

We will attempt to find a way out of this situation.

To Make Parts... It is not Important for What Machines

How to transform production in order that automation of the manufacturing of small-series products be economically advantageous, i.e., so that the production cost of the product depended little on the size of the series production?

Here is how -- let the given production facility manufacture not a finished machine or its units, but parts of a certain type, united by the similarity of their manufacturing technology. It is not important for what machines these parts are intended. Another thing is important -- to obtain full automation of such parts, similar to each other, easily and economically advantageous. The production cost is reduced considerably. A most "representative" part (the most complicated, created by analysis and imagination) may be selected and the sparsely manned production facility is oriented toward it. The limited amount of equipment and the constancy of the type of product make it possible to use, in the entire technological process, a single type or very similar technical solutions on automating individual technological processes so that we have the possibility of creating a sparsely manned production facility that does not depend on the mass and product list of the parts. Such a production facility is not determined by the concepts of "mass production," "series production," or "single unit production." It is different in principle.

Moreover, a limited set of operations for a large number of different, but of one type of products makes it possible to manufacture them in a short time on a high productivity, special automatic machine tool with ChPU [Numerical Programmed Control] that has a limited set of automated readjustments. As a result, the part manufactured in such a production facility will always be less expensive than in the traditional small-series production facility. Then these parts are sent to other plants -- including "manned" plants -- for additional machining and assembly.

Thus, flexible production facilities are sparsely manned ones for producing individual, most typical machine components and specialized assembly enterprises ("manned," as well as sparsely manned, but with a minimum volume of machining), that produce the finished product proper -- the machines.

Therefore, reasonable and flexible cooperation is needed between sparsely manned plants that primarily make simple products. If, before, the necessity of cooperation was dictated by the special features of the part, the complexities of its technology and, correspondingly, by the specifics of the equipment, which was not available in a particular enterprise, then now the cooperation requirement is stipulated by the necessity of the efficient design of automated production facilities. In other words, in the future, the sparsely manned plants will manufacture the usual shafts, gears, flanges, levers, forks etc.

The basic structural components of sparsely manned production facilities oriented toward one type of part are: automated warehouses of initial materials received in an orderly form; a system of sets of machine tools and other equipment with ChPU that form a complete technological chain and act according to a single program; a developed system of conveyors and transporters to transfer parts and intermediate products over the entire technological cycle; robots to load the technological equipment that services the conveyors and transporters.

#### Reinterpretation of Components to Create Something New

A radical reinterpretation of the technological organization of production -- the creation of flexible and sparsely manned production facilities, wide introduction of robots and manipulators -- will require the solution of related but most important problems. The first -- raise all auxiliary and "secondary" production services, already reached or attainable in the basic production facility, to a high level. For example, the warehousing facilities should become a plant shop with equal rights, automated to the maximum, using automatic stackers with free movement in several planes, with various types of clamps with remote or programmed controls. The basic role of the set-up shops should be that of basic production shops of supplier plants.

Already, today, metallurgical plants strive to produce especially precise sheets with minimal tolerances, rolled stock only of the necessary shape and held precisely to dimensions and quality. Supplier plants also produce especially precise castings etc. In a word, intermediate products must be maximally close to the parameters (not only dimensions) of the finished product.

Such a process, undoubtedly progressive, began at our plants a comparatively long time ago and, to a certain extent, spontaneously; it continues to expand, opening up new enticing possibilities. This process must be directed skillfully and a great amount of scientific research work concentrated on it. It promises a considerable saving of various resources and makes it possible to raise productivity.

Modern production is presented to us more and more clearly as a complicated, yet integral organism, saturated in a multiplicity of processes, with ties between processes having, at the same time, the most varied properties -- apparent and hidden, direct and reverse, single-step and multistep.

The amount of data necessary to deal with in creating an information-control system of a sparsely manned plant, brings to the problem a qualitative novelty; the greatest difficulties are related to the solution of the problem of creating powerful systematic production software. On the basis of computer control, the technological processes of the entire enterprise will be combined into a single structure. Technology design and development may be mechanized simultaneously, and a link-up will be provided between technological process control and automated production control systems.

The problem of the reliability of all the processes and links arises. A weak unreliable link here is especially intolerable as compared to the traditional technology and organization of production. The high productivity facilities being created must be exceptionally reliable in the operation process which is tied, to a great extent, to the use of diagnostic facilities based on the computer.

All processes, down to the smallest ones, must proceed synchronously in a given rhythm. Malfunctions and interruptions that impede production become intolerable. The general production rate is accelerated and becomes incommensurable with previously known technology.

Now...What Should be Considered New?

For new production, we must be ready to accept new in principle machine tools, apparatus, processes, and tools. We must learn to accept the new as a natural phenomenon, no matter how unusual it would seem to be at first glance.

The basic equipment of new plants must embody the latest achievements of science and technology. Already many laboratories and design bureaus now create new technological processes that promise a revolution in treating materials. We are speaking about laser technology that makes it possible to create super-high pressures and temperatures in the treatment zone; about using plasma metal spray coating to produce higher quality individual sections of the parts.

New machine tools must appear whose work is based on combining various previously incompatible operations (cutting, heating, deformation). Multioperation technological processes will be replaced by few-operation technology, using the technology of various degrees of divisibility and discreteness (powder metallurgy, molecular and atomic technology).

In the long range is the use of magnetic and electromagnetic fields for acting on the metal structure, the use of high pressure jets of liquids and particles as actuators for treating devices. Of course, taking into account economic factors is a must.

We are striving to utilize the discovered economic reserves to a maximum. Regrettably, the existing, habitual processes, apparatus and machines are frequently unable to "meet us halfway" and offer a perceptible and efficient economic effect.

On the other hand, designs and inventions that have something new in principle can offer such an economic effect. Moreover, some inventions are aimed precisely at the problem of bringing a perceptible effect measured in tens of thousands of rubles.

Economics is always a criterion of the usefulness of a technical novelty. Simultaneously, although this is frequently forgotten, it is also a criterion of originality, newness of the process, machine tools and equipment. In the case of patents, novelty and usefulness (economy included) are an integral whole in evaluating technical proposals.

Sparsely manned, flexible production facilities -- are new in principle structures of machinebuilding. We are speaking about raising the efficiency of production not by several percent, but by tens of times.

From sparsely manned shops to sparsely manned industries -- in a somewhat idealized form, this is the basic direction of scientific-technological progress in machinebuilding.

Fig. 1. Various robots and automatic manipulators designed in the State NII of Mechanical Engineering imeni academician A. A. Blagonravov of the USSR Academy of Sciences, distinguish the novelty of the engineering solutions, the high speed and accuracy of work. Experimental specimens are embodied "in metal" and find application in the most varied sectors of industry.

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## AUTOMATED LINES AND AGGREGATE MACHINING SYSTEMS

### ORSHA PLANT'S NEW NC MACHINES, SHORTAGE OF QUALIFIED OPERATORS

Minsk PROMYSHLENNOST' BELORUSSIYA in Russian No 3, Mar 83 pp 20-22

/Article by A. Kononovich, director of Orsha Tool Plant: "A Full Work Load for Machine Tools"/

/Text/ In accordance with "Basic Trends for Economic and Social Development of the USSR for 1981-1985 and for the Period to 1990," the task of equipping the national economy with advanced equipment and tools permitting labor productivity to be increased sharply and the quality of the products being produced to be raised to a higher level has been posed before the machine tool and tool industry. The collective of the Orsha Tool Plant is making a significant contribution toward resolution of this problem.

Mastering production of new types of tools, including those with wear-resistant coatings, those made from tungsten-free hard alloys and other superhard materials for machine tools with ChPU /numerical program control--NC/, automatic lines and automated units is being done at our plant in accordance with a specially developed program. In particular, increasing the output of active control devices and photoelectric angular displacement converters for the new generation of machine tools with NC, as well as the clamping tools for "machining journal" type machine tools by a factor of 2.5-3 during the 5-year plan. That which has been planned is successfully being carried out. For example we are producing twice as many active control devices as in 1980, and the share of cutting and clamping tools for machine tools with NC and automatic lines has reached 60 percent of total production volume.

While mastering the production of new types of tools and instruments, we are increasing their output at the same time and are resolving questions about the growth of labor productivity. There is no need to prove that automation of the operations of metal cutting tools is one of the main ways for increasing productivity since the parts manufacturing process occupies a significant place in the total picture of labor intensiveness.

Statistics attest to the fact that now 60-80 percent of the parts for machinery and equipment is manufactured in small or medium series, which dictates those production methods which would insure high productivity for relatively small

batches of items. Studies by industry institutes of the various ministries have established that when parts are machined on universal and special machine tools with manual control, the net time of metal cutting fluctuates within limits of 6-12 percent of the machine tool's working time, and it reaches 20 percent only for individual types of equipment. The use of machine tools with NC will permit the net time to be increased.

All of these calculations also have a direct relationship to our enterprise. The multiplicity of the products we produce (up to 80,000 standard dimensions per year) does not permit us to restrict ourselves to employing only universal equipment. Replacing it with machine tools with NC creates wide possibilities for automation of industrial processes and reducing the production cost of items.

Just within the group of lathes with NC, the economic effect was R61,500 the first year of incorporation. Having been assured of the unconditional advantages of the new equipment, we decided to substantially increase its relative significance within the total machine tool inventory: presently this indicator exceeds five percent.

The efficiency of incorporating machine tools with NC is in many ways determined by the system of measures taken to maintain their operating capability, standardization of parts being produced and efficient developments for manufacturing process and control programs. We were convinced that proper organization of maintenance and setup of machine tools with NC is of crucial significance. Daily observations show that a drop in work capability of machine tools or NC devices during the operating process occurs primarily because individual pieces of machinery, devices or components age, are worn or get out of adjustment. The efficiency of this equipment depends on how its operation under workshop conditions is organized, on servicing and operation. Here at the factory, we employ a centralized form of repair service organization, attaching it to groups of equipment with NC. We consider efficiency in carrying out repairs and adjustments after an emergency breakdown of individual assemblies, pieces of machinery or NPC devices to be the most important requirement for centralized servicing and repair.

Let us recall that periods of idle time for this equipment are very costly, with costs ranging from R1.25 to R5 per hour, depending on the model. The availability of a centralized service with specialist personnel for the individual devices and types of machine tools provides the necessary condition for more efficient performance of emergency repairs and permits idle time to be reduced to a minimum. This form of repair service organization also makes it possible to use human resources, materials and spare parts and to incorporate various improvements more efficiently. As an example, the initial processing shop's sector of machine tools with NC, where 40 pieces of equipment are installed, consists of groups of instrumentation and automatic machinery (IAM) troubleshooters and groups of fitters. The groups of IAM troubleshooters consist of the following personnel: a group leader--an electrical engineer, 10 troubleshooters and 1 electronics technician specializing in repair of boards and testing them for work capability. When repairing a NC device, the faulty unit is replaced with a spare. The maintenance department for machine tools with NC makes the repairs on the defective unit and then checks it out on a test bench. Between

five and seven machine tools with NC are assigned to each IAM troubleshooter. The functions of the troubleshooter group include the following: maintaining and repairing NC devices, electrical equipment and the electric drive units for the machine tools; working out new circuit decisions and producing devices which increase equipment reliability; control over the assembly of machine tools with NC and participation in setup and putting them into service; compiling requests for spare parts and accessories for the control systems and NC devices and compiling schedules for testing equipment work quality. Moreover, the troubleshooting group bears, jointly with the other services, responsibility for continuous operation of the machine tools.

Metal working machine tools with NC, as the most effective means for automating small series production, require more frequent maintenance than do general purpose equipment. The qualifications of repair and servicing personnel affect the quality of maintenance. For example, up to 30 percent of the failures within the systems of program device occur precisely because of the poor qualifications of those servicing it. Therefore training of personnel and increasing their professional level through industrial engineering courses and courses for specific purposes is a most important component of the complex of operations being performed.

Repair and servicing of the mechanical and hydraulic parts of machine tools with NC is performed by a group of four repairmen. A schedule for maintenance and capital repair has been set up. The repair and machine shop carries out capital repair of machine tools with NC. Intra-shift idle periods for machine tools are recorded in a special log. Measures intended to reduce periods of idle time are worked out on the basis of results of their analysis. All engineering violations, the deadline for their correction and the service groups which must intensify checking efforts are recorded in logs that monitor operational discipline.

Much has been done to improve the operating reliability of machine tools with NC, their efficient adjustment, development of control programs, etc. Since in small-series production the range of dimensions for the parts being machined is great and the installation of terminal cutoffs by coordinates takes a great deal of time, we prefer to use free adjustment: for each range of diameters for the blanks being machined, the optimum distance to the tool is selected and coordinates from the center and the butt of the blank are recorded on the control program. The first adjustment to the necessary dimension of the part is usually done by testing cycles and further correction. So as not to make a readjustment should there be a malfunction of the control system or should the tool fail, the step showing the last contact of the tool is noted in the control program. When there is a malfunction, it is necessary just to set the ready part on the lathe and touch the indicated point on the part with the tool. Then the control program sets itself at the recorded contact point and completes machining it until completion so that the cutting tool comes off at the required point. The machine tool is again adjusted for the part. This method is effective when machining is performed with one or two tools.

The tailstocks of the 1A616F3 and 16K20F3 lathes have been modernized by the plant's efficiency experts. In the journals which were being used previously,

the bearings were situated in the journals themselves, and now they have been shifted to the tail spindle of the tailstock. When the journal breaks or wobbles above what can be tolerated, the centering insert is replaced (it is made to be quickly removable). This made it possible to reduce bearing consumption considerably. The removed centering inserts are repolished. Forced lubricant delivery into the bearing has been provided, as a result of which breakdown levels have been significantly reduced.

A floating carrier plate has been developed and incorporated. Clamping the part with the rear journal, the floating journal embeds itself and the part is cut into the toothed carrier. This type of carrier plate is used for machining parts up to 50 millimeters in diameter.

A cutting tool holder for the tool attachment of the 16K20F3 lathe has been developed and incorporated at the plant, permitting the range of applications for the standard tool to be expanded on lathes with NC and the number of operations performed on a single unit to be broadened. The 2PT-71 panels on the 16K20F3 lathes were replaced by the more advanced N22-IM by the group of IAM troubleshooters.

Control programs for machine tools with NC are worked out both manually and automatically. A specialized system of automated program calculation (SAPC-tool) for controlling model 1A616F3 and 16K20F3 lathes for machining drills, counter-sinks and reamers has been incorporated. The net cost for developing and producing control programs automatically is lower by a factor of 4 as compared with the manual method. A request for development of a manual control program is given to the shop's planning and distribution office well in advance. Included in the request are all the necessary parameters for the blank. Master control programs are kept at the NC office's equipment room. The control programs are issued to the shop on the request of the foremen. A group of nine programmers is subordinate to the chief production engineer's division.

The group has two STA-1M telegraph units and the same number of "Brest-1" UPDL /expansion unknown/, a WPT-71 control panel and an N22 control panel for recording and monitoring the control programs.

The plant's specialists modernized the device for preparing data on perforated tape, which made it possible to perform these operations for the 1A616F3 and 6R11F3 lathes on the "Brest-1T" UPDL. Thanks to this modernization, the time for preparation, duplication and correction of the perforated tape was reduced. A unit for checking the control programs outside of the machine tool has also been introduced. To increase the load capacity of the machine tools with NC, the rough machining of individual types of clamping and cutting tools is done on TR-6, VT-10 and VT-11 hydraulic copying lathes.

The numerical program controls division is developing and incorporating operational production processes for machining items according to our plant's blueprints. The production processes proposed by the programmer-production engineers of the NC division are coordinated with the production engineers from the client shop. Then the production process is checked by the most experienced programmer-production engineer, and it undergoes standards control and then

proceeds to all the necessary departments. The document of introduction is a document certifying incorporation of the developed operational production process. On production coming from one-time orders (client's blueprints), no operational production process is drawn up, but control programs for machining the item on tools with NC are worked out, as is a sketch of the lathe's turning work, which is coordinated with the production engineer from the client shop. The client production engineer and the programmer-production engineer jointly bear responsibility for product quality.

Of course we do not consider the system of operation and servicing for machine tools with NC which has developed here to be ideal. The system is changing and improving as new products are being mastered. The successful fulfillment of quotas for output of new, advanced types of tools for the national economy remains the primary criterion.

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## ROBOTICS

### EVOLUTION OF USSR - CEMA ROBOT PRODUCTION REVIEWED

Moscow PRAVDA in Russian 25 Apr 83 p 6

[Article by B. Barakhta under the heading "...Cooperation": "A Dream Come True"]

[Excerpt] At the same time, we are aware that robot engineering is currently so complex and interbranch in nature that attaining good results in it is often beyond the efforts of a single country, especially small ones. Socialist integration and division of labor move to the fore. The development of cooperation and interaction in the field of developing industrial robots augments the strength of the cooperating countries and is a powerful impetus to scientific-technical progress.

The general agreement on multilateral cooperation in developing and organizing the specialized and cooperative production of industrial robots which was signed last year during the 36th meeting of the CEMA Session in Budapest is oriented towards this policy. Its purpose was to meet as fully as possible, on the basis of international socialist division of labor, the requirements of various branches of the national economy of the fraternal states for automatic preset-control manipulators and their standardized modules, subassemblies and parts, as well as for slave units and attachments permitting the set-up of robotized technological complexes. It is anticipated that the aggregate fleet of robots in the socialist countries will have reached 200,000 units by 1990.

"The scientific-technical and production base for implementing this program has been created in many fraternal countries," says V. S. Belov, director of the ENIMS (Moscow Experimental Scientific Research Institute of Metal-Cutting Machine Tools). "Specialists at the USSR Machinebuilding Science Center, which includes the 'Stankomstruktsiya' plant, have contributed to laying its foundation. In May, the ENIMS celebrates its 50th anniversary, and I must say that our collective has done quite a bit during those years to establish and develop robot engineering both within the Soviet Union and in a number of states of the socialist community.

In 1935-1936, the USSR Machinebuilding Science Center designed and manufactured the first unitized machine tools and automated lines; it created the world's first automated plant for producing automobile pistons, an automated bearing production shop, and dozens of automatic lines for machining general-purpose machinebuilding parts. ENIMS specialists were present at the birth of the Sofia

Metal-Cutting Machine Tools Plant (IMM), specialized to develop robots, and the "Beroye" robot-engineering scientific-production combine (NPER) in Stara-Zagora, Bulgaria. Hundreds of scientists, specialists, engineers, technicians and workers from the People's Republic of Bulgaria, Poland, Vietnam, Czechoslovakia, the GDR, Romania, Hungary and many other countries have studied, improved their skills and mastered new specialties with innovators at the science center and in shops at the "Stankokonstruktsiya" plant.

The Moscow Experimental Scientific Research Institute of Metal-Cutting Machine Tools and the Sofia Metal-Cutting Machine Tools Institute have been developing fruitful cooperation in the area of industrial robot design and development for more than 10 years.

"We began with first-generation robots," recalls V. S. Belov. "We familiarized ourselves with the technical documentation, compared models and sought ways in which to cooperate closely. Our Bulgarian friends dealt with blueprints for our multipurpose manipulators and we handled the 'Pirin' robots, which are now 'working' successfully on automatic lines at the Kama Motor Vehicles Plant.

Today, these ties have long since been raised to a qualitatively new level. A new robot for unitized machine tools has been designed and developed through our joint efforts and has been tested successfully at a Kharkov plant. This year, the "Beroye" robot-engineering scientific-production combine will begin series-producing it and delivering it to the Soviet Union.

Together with their colleagues from Bulgaria, specialists at the ENIMS are actively preparing production of the "Don" grain harvesting combine within the framework of developing socialist integration and division of labor. Thus, the Soviet component has taken on the task of developing the automatic lines and the Bulgarian component is developing industrial robots for this new agricultural machine.

The center's cooperation with Czechoslovak colleagues has been strengthened and successfully developed in recent years. This five-year plan, as was noted at the 16th Czechoslovak Communist Party Congress, the republic is faced with producing 4,000 industrial robots of 18 types. In this regard, particular attention is being paid to developing second- and third-generation machines. There are quite a few bilateral and multilateral points of interaction in this area.

Czechoslovak specialists from the "VUKOV" scientific-production association in Preshov have developed, using technical documentation worked out at the ENIMS, a second-generation robot, the UM-160, which was awarded a gold medal in 1982 at the International Trade Fair in Brno. The CSSR is currently setting up series-production of the UM-160 for machinebuilding branches of republic industry and has planned deliveries to Soviet enterprises. Socialist competition developed among Soviet and Czechoslovak collectives facilitated the delivery ahead of schedule of a Soviet automatic preset-control manipulator to industry in this fraternal country.

ENIMS specialists, jointly with "VUKOV" associates, are currently developing a new industrial robot, based on the UM-160, for machine tools in the drilling-milling-grinding group. Moreover, a program for standardizing automatic manipulator assembly components is being developed on a trilateral basis in cooperation with our Bulgarian colleagues.

"A very great deal of importance has been given recently to the unit-module principle of robot construction in CEMA countries," says the ENIMS director. "For example, 128 automatic preset-control manipulator models are already operating in machinebuilding in Bulgaria, Hungary, the GDR, Poland, Rumania, the USSR and Czechoslovakia. Experience has shown that the delivery of one or two robots to an enterprise is not effective. We need to provide whole lines and complexes with these assistants. In this regard, such complexes must be released to customers on a 'turnkey' basis, fully set-up. That's when the robots 'prove themselves.' We already have some experience in this. An automated production facility which includes several robotized complexes has been created at the 'Dinamo' plant in Moscow, permitting a significant improvement in labor productivity. However, modules, subassemblies and other components should be unitized and the quality and reliability of the electronic equipment should be sharply improved in order to create such flexible production systems equipped with robots. Incidentally, their development, in cooperation with the fraternal countries, is practically complete. The general agreement signed in Budapest orients us towards such improvements. Without them, it will be impossible to continue working successfully on the development of third-generation industrial robots.

That will be a significant step forward in our cooperation. How do the generations of hand-made machines differ? The first robots were reminiscent of a scarab beetle in terms of "intellect" and activity: one strictly prescribed program — feed the part, for the manipulator; roll the ball of dung, for the beetle.

The second-generation robots are "smarter" than their predecessors. They select the needed part within, position it and place it in the machine tool. We are now developing third-generation automatic manipulator models equipped with computers and a well-developed sensor system, including mechanical "sight," which enables the robots to analyze their environment, to "see" and "feel."

Thus, a dream is becoming reality. But whereas in legend and fable and in K. Chapek's play, robots in the end grow disobedient and turn into a force harmful to man, the robots of our time are really good helpers for workers in the countries of the socialist community. And whereas in the world of capital, scientific-technical progress is often translated into rapid growth in unemployment and other social ills for the common man, the workers of the fraternal countries confidently look to the future of the scientific-technical revolution.

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## ROBOTICS

### PLANT MANAGER INTERVIEWED REGARDING ROBOTIZATION PROGRAM

Moscow LENINSKOYE ZNAMYA in Russian 11 Jun 83 p 2

[Text] The "Basic Directions of USSR Economic and Social Development in 1981-1985 and Up To 1990" pay a great deal of attention to the development and introduction of robot engineering and equipment. Our at-large correspondent, Ya. Dvoretzkiy, asked Candidate of Technical Sciences V. I. Korobkov, chief of the automatic manipulators and industrial robots laboratory at the Podolsk Machine Plant imeni M. I. Kalinin, to discuss how questions of the use of robot engineering are being resolved at that enterprise.

"The introduction of robot equipment in plant shops," says Vladimir Ivanovich, "is one important point of the five-year plan for retooling. As is known, in accordance with the decree of the CPSU Moscow Committee secretariat, [Moscow] oblast has created a Coordinating Council for Robotization Problems and has also determined base enterprises, including our plant."

[Question] What is being done at the plant to implement that decree?

[Answer] The plant has drawn up a concrete program and work on introducing robot equipment is already going, one might say, full bore.

This year, along with the existing 10 pieces of robot equipment in the injection molding shop (used for pouring and molding sleeves and sewing machine platforms), another 15 manipulators will be issued visas to the plating, stamping, heat-treating, varnish-coating and other shops.

And this is only a modest beginning.

The rates of robot-equipment complex introduction must increase in subsequent years. The prospects for using automatic manipulators and industrial robots in the production of home and commercial sewing machines are now standing out in sharper detail. The efforts of our laboratory's collective are currently aimed at developing a robotized press shop sector for stamping parts. Two robots are currently in operation there, but another 15 will also be installed.

We anticipate the subsequent development of similar robotized sectors in the machining shops.

[Question] Vladimir Ivanovich, robot-engineering specialists are needed to install and service these mechanical assistants which free us of cheerless, monotonous work in the plant's shops. How is the problem of specialists to introduce, service and repair this equipment being solved?

[Answer] Developer-engineers are being trained days and evenings at specialist retraining departments attached to the Moscow Higher Technical School imeni Bauman and the Moscow Machine Tool Manufacturing Institute. Special target courses have been set up for repairman to train middle-link personnel to service manipulators already introduced at the plant. Leading specialists from our laboratory are teaching them. Fifteen people have taken the courses and will in the very near future be helping us solve the operator-repairman problem.

The plant is now solving the problem of creating a service specialized in operating and repairing robot equipment.

[Question] One still encounters among some workers the opinion that the introduction of robot equipment will not yield tangible results. What could you tell us apropos of this?

[Answer] The advantages of robots are borne out by their extensive introduction at leading enterprises. No profit is required.

It is another matter where and how to introduce them. If robots and manipulators are installed at machine tools where the shift index is low, for example, don't expect a good return. Everything must be well thought-out.

Many administrators and specialists need to change their traditional concepts about organizing technological processes. Freeing people from manual labor and obtaining an economic benefit must be a striving running through the organization of any technology.

[Question] Vladimir Ivanovich, this is something new. I should like your opinion on the difficulties a collective encounters in the course of robotizing production.

[Answer] LENINSKOYE ZNAMYA has published an article by V. Galkhin, chief of the mechanization and scientific labor organization department at the "Metalist" plant in Serpukhovsk. In it, he cites the problems the Serpukhovsk enterprise is not capable of solving itself. Those problems apply in their entirety to our enterprise as well. And our branch headquarters, the Ministry of Machine-Building for Light and Food Industry and Household Appliances, does not yet have the economic substantiation for the efficient application of robots and, as a result, it is impossible to estimate the economic impact of introducing this equipment at the plant. Our enterprise has also been forced to design and manufacture for itself all the fittings and parts it needs for manipulators, and under what are actually semi-primitive conditions.

Many ministries have developed and are series-producing monotypic automatic manipulator models different in name only. We therefore think the USSR State Committee for Science and Technology now needs to weigh and evaluate all the merits and shortcomings of existing industrial robot designs and to develop

several base models on their basis. These could be assembled from finished sub-assemblies -- structural modules -- whose series production can be set up.

The material stimulation of the labor of robot equipment developers is also unclear. In fact, bonuses are awarded from the economic impact obtained which, as we indicated above, cannot be estimated.

In order to avoid a personnel problem, we need the centralized training of robotization specialists. The USSR State Committee for Labor and Wages introduced last year a new occupation -- "preset-control automatic manipulator repairman" -- into the unified rate-skill handbook. These repairmen must have a special secondary-technical education. Unfortunately, as of today, no secondary technical special educational institution is graduating such specialists. The personnel question is critical.

I should think that if these problems disturbing us were solved, the question of introducing robot equipment could only gain. Rooted traditions are being broken and existing plant production is being restructured already. This is not easy, but Kalinin workers can be aided in coping with the difficulties by the creation of what will make the utilization of robot equipment less difficult for us than it already is. Today is hard, tomorrow will be easier.

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## ROBOTICS

### BRIEFS

PLANT AUTOMATION BY 1990--More than 6,000 robots and manipulators are presently in operation at enterprises in various republics. Wide use of microprocessors in their control systems will allow the functions of robots to be substantially broadened, and the robots to be turned into perfect, logical, self-adjusting systems or figuratively speaking, have their intellect raised. In accordance with the all-state program for the automatization of production, it is anticipated that by 1990, a total of 22 automated enterprises and 64 automated complexes will be built, including some based on flexible manufacturing production lines using robots. More than 40 ministries and departments are taking part in carrying out this program. Implementation has also successfully begun on the joint program for the development of microprocessing technology, according to which by 1990, 50 leading types of apparatus will be created, of which half will be put into series production. According to specialists, this joint work by scientists and specialists of fraternal countries will have an economic effect of R5 billion roubles. [Summary] [Moscow Domestic Service in Russian 1300 GMT 21 Jun 83 LD]

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